

July 7, 1959

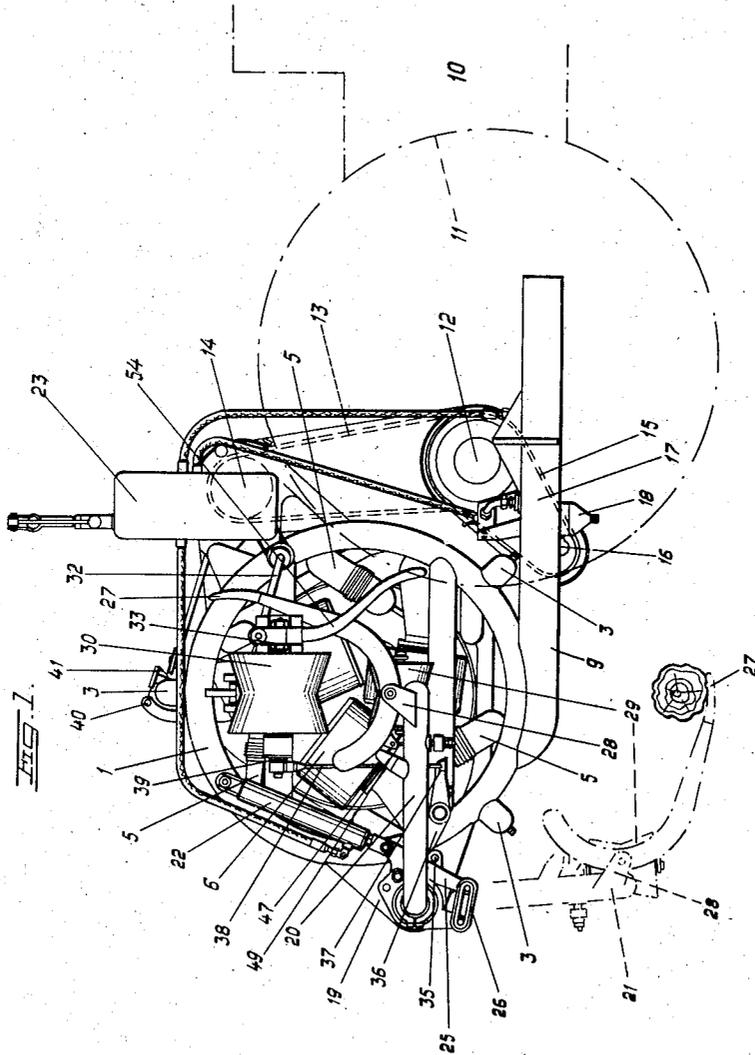
P. G. BRUNDELL ET AL

2,893,453

LOG HANDLING ARRANGEMENT FOR DEBARKING MACHINES

Filed March 15, 1956

4 Sheets-Sheet 1



Inventors
P. G. Brundell
K. E. A. Jonsson
By *Glaseck Downing Teebold*
ATTYS.

July 7, 1959

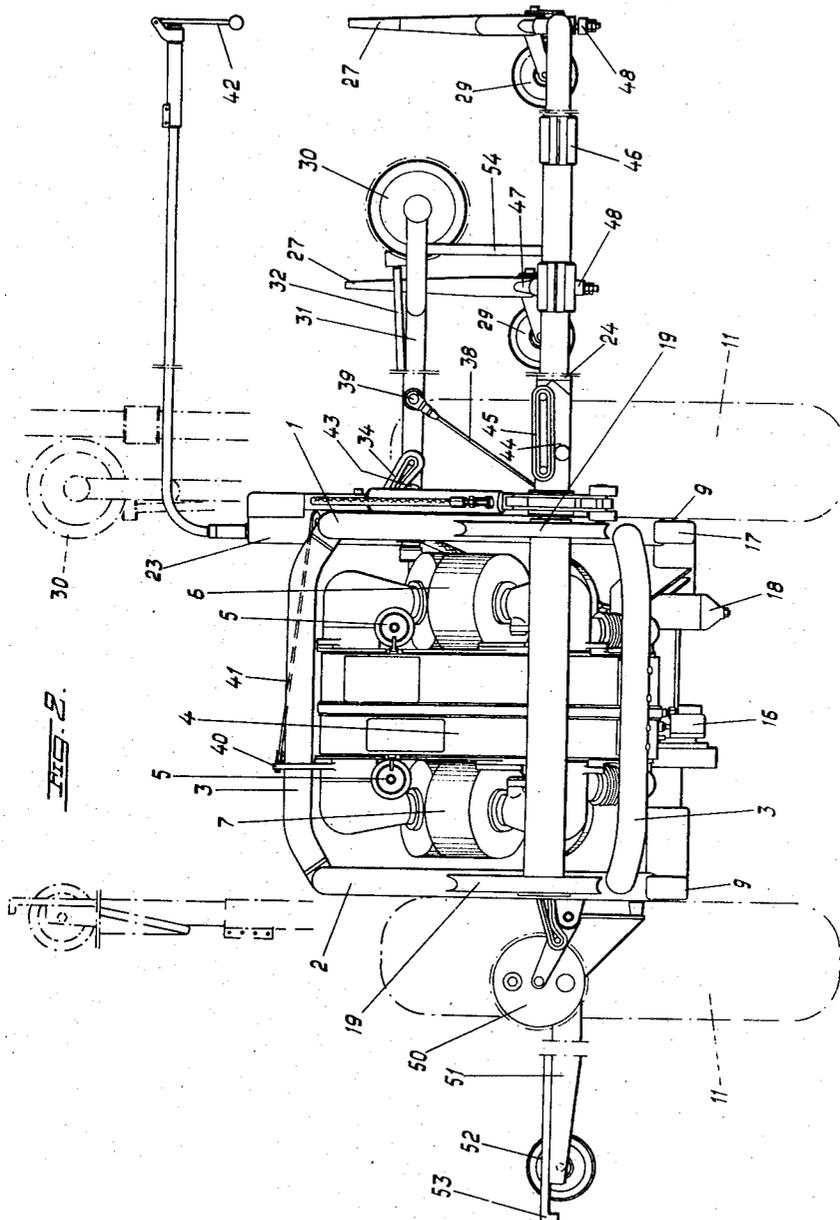
P. G. BRUNDELL ET AL

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4 Sheets-Sheet 2



Inventors

P. G. Brundell

K. E. A. Jonsson

*By Glasgow Downing Bebold,
Attys.*

July 7, 1959

P. G. BRUNDELL ET AL

2,893,453

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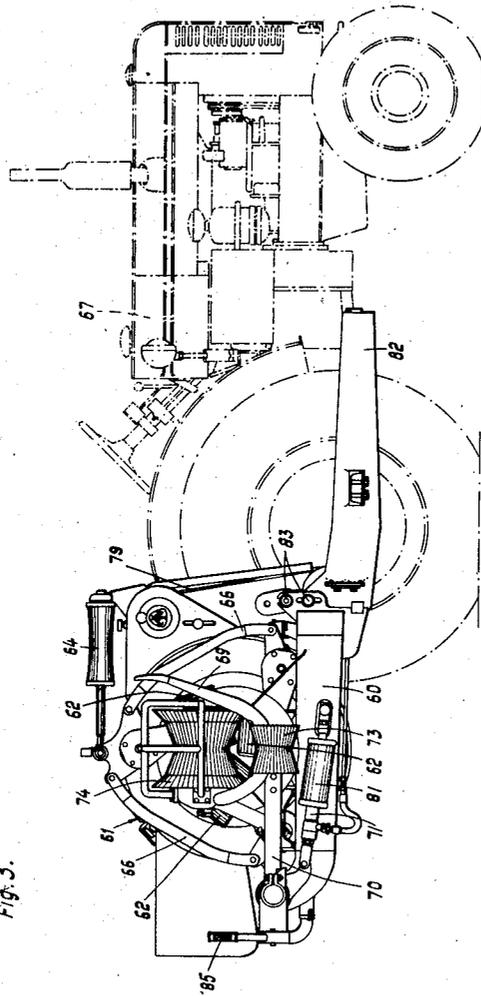


Fig. 3.

Inventors
P. G. Brundell
K. E. A. Jonsson
By Glasgow Downing Seebold
Attys.

July 7, 1959

P. G. BRUNDELL ET AL

2,893,453

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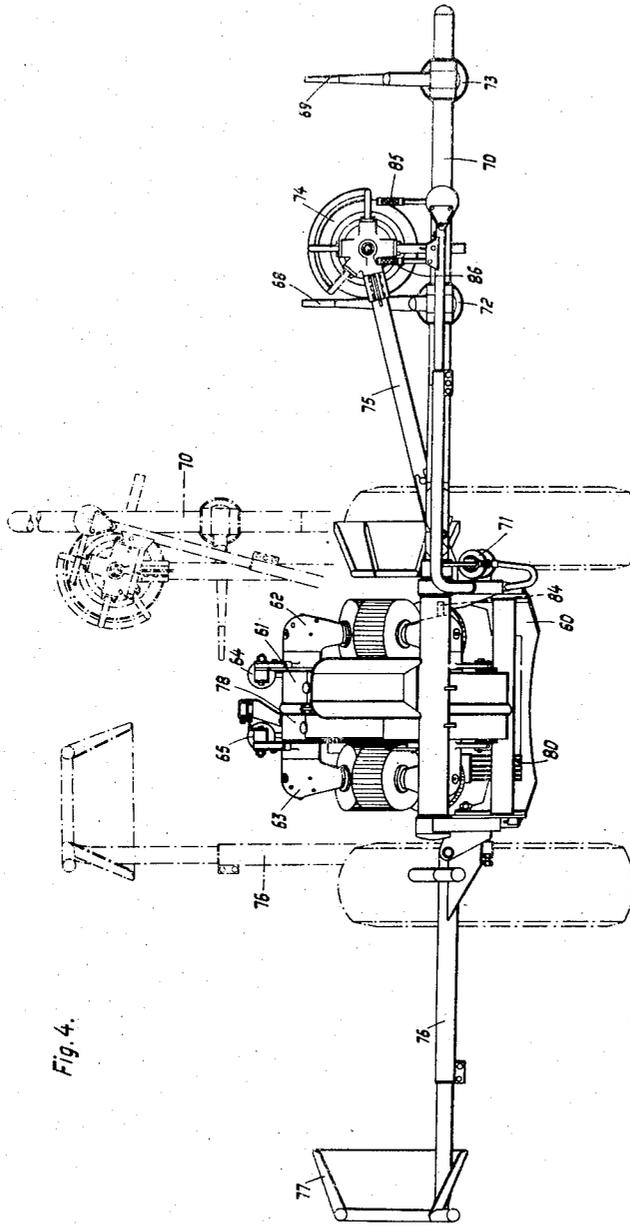


Fig. 4.

Inventors
P. G. Brundell
K. E. A. Jonsson
By *Glascott Downing Beebold*
Attys.

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LOG HANDLING ARRANGEMENT FOR DEBARKING MACHINES

Per Gunnar Brundell and Karl-Erik Arnold Jonsson, Gavle, Sweden, assignors to Soderhamns Verkstader A.B., Soderhamn, Sweden

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Claims priority, application Sweden March 16, 1955

12 Claims. (Cl. 144-242)

The present invention relates broadly to the art of debarking logs. More particularly, this invention relates to a long handling arrangement for debarking machines. Specifically, the invention relates to a log handling arrangement combined with a debarking machine incorporating the features described and claimed in our prior filed applications certain ones of which are not patented and identified as follows:

Patent No. 2,785,715, dated March 19, 1957, entitled "An Arrangement for Feeding Forward of Logs and the Like"; Patent No. 2,786,499, dated March 26, 1957, entitled "Rotary Debarker Having Pivotal Bark Removing Tools Biased by Elastic Rubber" and Patent No. 2,787,304 dated April 2, 1957, entitled "Machine for Removing Bark From Logs." The invention further particularly relates to log handling equipment for presenting logs to the feed-works of a debarking machine of the type described and claimed in our application Serial No. 573,279 filed March 22, 1956, and entitled "Machine for Removing Bark From Logs," Patent 2,857,945 dated October 28, 1958.

The invention therefore is directed to the art of handling timber, particularly to removing bark from logs and corporates mechanism to properly present logs to be debarked to a rotary hollow-head type debarking machine as disclosed in the above referred to applications.

In the art of debarking logs various type feed mechanisms are associated with the bark removing means. When the debarking machine is of the hollow-head type, that is includes a rotor, carrying bark removing tools and through which the logs to be debarked are fed with their axes substantially coinciding with the axis of the rotor, various type feed constructions such as fixed or resilient rollerways, belt or chain feeds have been used. The feed constructions thus provide a feeding path or line of feed. When this line of feed relative to the axis of the rotor of the debarking machine is disposed above the level from the logs to be debarked are removed and when such logs have to be moved longitudinally such as from a storage pond or river, conventional log-hauls have been used. When applying the logs to the feed path from the side thereof the same have to be lifted up manually. In other words, in known utilizations of hollow-head type debarking machines the feed works for feeding the logs to the debarking means and which feed works is usually closely adjacent the infeed side of the debarking machine it has been necessary to provide a separate complicated conveying mechanism such as that referred to as a "timberhorse" or a "loghaul."

Thus, in manipulating logs relative to a rotary debarker of the type in question means must be incorporated with the arrangement to feed the logs axially of the rotor whereas other mechanisms are required to present the logs to a position to be fed.

The present invention therefore has for an object to provide mechanism for handling logs and presenting them to a debarking machine of the rotary hollow-head type which is economical to produce and which incorporates

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means to elevate logs to be debarked to a feeding path and means to displace the logs longitudinally along said path.

It is a further particular object of the invention to provide log handling means which lifts logs from a lower level up to a feeding path without any substantial longitudinal displacement and while maintaining the logs at least in approximate parallelism with the axis of the rotor of the debarking machine.

It is an additional object to provide a log handling arrangement including the aforescribed means for lifting up the logs associated with means for horizontally displacing the logs toward the debarking machine along the feeding path.

As a still more specific object the means for horizontally displacing the logs toward the debarking machine includes components participating in the movement of the lifting means so that independent of the diameter of any log its axis will substantially coincide with the axis of the debarking machine with the horizontal displacement of the log toward the debarking machine commencing when the log has reached the proper level for presentation to the rotor of the debarking machine.

A further object of the invention is to mount the coordinated lifting and horizontal displacing means for return to an initial position following a predetermined movement of the log through the debarking machine.

It is a still more specific object of the invention to provide a portable debarking machine of the type including a mobile frame, a rotary hollow-head type debarking machine carried by said frame with the axis of its rotor transverse to the line of movement of the mobile frame and in which infeed and outfeed mechanisms are associated with the opposite sides of the debarking machine for feeding logs therethrough and in which a log handling mechanism including means for lifting logs from a lower level up to the level of the feed path of the debarking machine is combined with mechanism for horizontally displacing a log to be debarked when it has reached the level of the said path, with both said means and mechanism being carried by the mobile frame on the infeed side of the debarking machine. As a further specific arrangement the invention provides such lifting and horizontal displacing means mounted for swinging movement between an operative position extending transverse to the axis of the mobile frame and laterally thereof to an inoperative elevated position to facilitate movement of the portable debarking machine from one log pile to another and along narrow roadways.

While the construction of the present invention is particularly suitable for association with portable debarking machines such use is not restrictive, since it obviously can be used to advantage in association with stationary machines for lifting logs from the ground or from the water particularly where the space on the infeed side of the machine is limited. In an instance where logs are lifted from the water the compact structure of the present invention including a lifting fork means is ideally suitable since the bearing devices and chain wheels normally used on conveying means that remove logs from water ponds are not required.

Further and more specific objects will be apparent from the following description taken in connection with the accompanying drawings in which:

Figure 1 illustrates one arrangement incorporating the teaching of the invention as mounted on a tractor, illustrated diagrammatically, and with the direction of log feed being at right angles to the line of movement of the tractor;

Figure 2 illustrates the arrangement of Figure 1 as viewed from the rear of the tractor;

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Figure 3 is a view similar to Figure 1 but illustrating a modified form of the invention and

Figure 4 illustrates the arrangement of Figure 3 as seen from the rear of the tractor.

The form illustrated in Figures 1 and 2 includes a cage like construction consisting of two large pipe rings 1, 2 and three connecting pipes 3. Within this cage construction is mounted a debarking machine 4, of the type disclosed in the aforementioned patents, particularly Patent No. 2,857,945, and including triangularly arranged infeed and outfeed rollers 6 and 7, respectively resiliently actuated against the fed logs by means of spring means 5. The debarking machine 4 is bolted to the lower connecting pipes 3 and the whole structure or "cage" is carried by two pipe frames 9 fixed to the tractor 10. The contour of the rear wheels of the tractor is indicated by 11. The drive for the debarking machine and the associated lifting and feed-in means includes the belt sheave 12 driven by the power take-off of the tractor driving by means of V-belt 13 the intermediate shaft 14 which furnishes drive to the rotor of the debarking machine and the infeed and outfeed rollers 6 and 7. A V-belt 15 driven by belt sheave 12 also drives an oil pump 16. One of the frames 9 is provided in the interior thereof with an oil reservoir 17 and also carries the oil cleaner 18.

In two large lugs 19, protruding rearwards from the pipe rings 1 and 2 is journalled a fork shaped lifting device or arm 24 illustrated in full lines in the uppermost conveying-in position 20 and also in dotted lines in the lowest picking-up position 21. The lifting movement of the fork shaped arm is effected by means of the hydraulic piston and cylinder means 22, which is controlled from a suitable hydraulic valve in a control box 23. The piston and cylinder means 22 acts on the fork shaped arm 24 via the swingable intermediate piece 25 and the rubber spring 26. The outermost part 27 of each arm of fork shaped device 24 is tiltably journalled in the lugs 28 mounted on the respective arms. The purpose of tiltability is partly that the fork tips or parts 27, within certain limits, will be able to automatically adapt themselves along the ground level and partly that double conical rollers 29 carried by swingable parts 27 of the fork shaped arm or lifting device 24 will be able to adjust themselves about horizontally, independent of the log diameter, when they cooperate with the spiked feed-in roller 30 disposed above fork shaped device 24 and journalled in the outer end of a pipe arm 31. The arm 31 is swingable in the vertical direction and spiked roller 30 is driven by the feed mechanism of the debarking machine via the articulated shaft 32 and the worm gear 33. When the fork arm is lowered, the spiked roller arm 31 is lifted up by the rubber band spring means 34. When the fork arm is turned upwards to a certain position, and abutment 35 on the fork arm will act on one end of a double armed lever 36 mounted on the pipe ring 1. The other end of the lever 36 carries a loop 37 to which is attached a wire 38 that extends to a joint 39 on the spiked roller arm 31. The members included in this motion transmission means are so correlated that the roller 30 during the last part of the lifting movement of the fork shaped arm moves the same distance downwards as the rollers 29 move upwards. For this reason a log will be pressed between the rollers 29 of the fork shaped arm and the upper roller 30 in a position well centered and defined for proper feeding into the debarking machine. Due to the hydraulic pressure prevailing in the lifting cylinder 22 the pressing force applied by and between the rollers might become very high if it was not limited by stretching of the rubber bands 26. When a log is pressed against the continually driven upper roller 30, the conveying or horizontal displacement of the log into the grasp of infeed rollers 6 on the debarking machine is immediately automatically started. The fork arm 24 will remain in its upper position until the log reaches the outfeed rolls 7 on the discharge side

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of the machine, which rolls in their movement from the abutment stops in their inner position, will adjust the hydraulic control valve by means of the lever 40 and the wire 41, so that oil can flow backwards to the reservoir and the fork shaped arm will thus fall back down to the ground. Another log is then rolled on to tiltable fork parts and a control impulse for the hydraulic system to start a new lifting movement is initiated either manually by operation of lever 42 or, if desired, by means of a cam disc means, not shown, which receives drive from the feed mechanism and which acts on the control valve and is so adjusted that the distance, lifting and stop times will become in accordance with a suitable feeding program.

The above described and illustrated embodiment of the arrangement is swingable or foldable upwards, as indicated diagrammatically in Figure 2, via a pivot joint 43 and hinge means 44. A rubber band spring means 45 operates to facilitate the lifting movement by balancing the dead weight of the fork shaped arm. The distance between the log-receiving arms of the fork means is adjustable by means of the bracket 46. The movement for the tiltable outer part of the forks is limited by the rubber stops 47 and 48, the latter one actuated by the pulling link 49. In certain cases it is advisable not to construct the base of the fork shaped arm straight, but to form the intermediate portion between the log-receiving arms with a large bend downwards in order to facilitate applying logs to fork parts 27 with a timber hook manipulated by a person standing behind the fork shaped arm. On the discharge side of the machine there is provided a suitable receiving device, for instance a resilient roller 50 and a likewise resilient feed table 51, in the outer end of which is provided a double conical roller 52 and a stop 53, by which the receiver easily can handle the logs discharged from the machine. An entirely automatic laying down at right angles to the feeding out direction can be attained comparatively easily.

The lifting movement of the forks can easily be made so fast that a log by its own weight does not properly roll down onto the conveying rollers 29 on the fork shaped arm, but gets jammed between the fork tip and the edge of the upper roller 30 against the worm gear. By arranging a side guiding arm 54 in the outer part of the arm 31 of the upper roller 30 to extend substantially at right angles to the longitudinal direction of arm 31 all logs are forced into a correct grasp between the upper and the lower rollers 29 and 30 even during the fastest lifting speed. During upward movement of the lifting device, the side guiding arm 54 makes possible that lost time due to limited lifting speed can be considerably decreased.

If the conveying means during their lifting movement are given a straight lined path in the vertical direction, for instance by mounting them in a guide extending from the ground level up to the level of the feed or conveying-in path for the logs, the importance of the conveying-in arm will not come into consideration.

The embodiment illustrated in Figures 3 and 4 includes a frame 60 on which is mounted a debarking machine 61 of the hollow head type, provided with pivoted triangularly arranged feed rollers 62 and 63, which are resiliently actuated by means of pipe shaped tension springs 64 and 65 of rubber, acting on the uppermost of the feed roller arms on each side of the debarking machine, while the arms of the other two feed rollers are connected with the arm of the first mentioned feed roller by means of links 66, see our patent No. 2,857,945. The frame 60 is carried by a tractor, designated by 67, via a supporting construction 82, bolted to the chassis of the tractor. The drive for the debarking machine is effected by V-belt means 79 on a belt sheave on the power take-off 80 of the tractor. The frame 60 can be vertically adjusted by means of screws 83 in relation to the tractor,

so that the tension in the V-belt means 79 will become as desired.

For lifting logs from ground level up to the level of the feed path and for conveying the same into the feed works of the debarking machine there is provided an arm 70 having fork shaped members 68 and 69. This arm is journaled on a pipe in the rear part of the frame 60 and can be turned by means of a single acting hydraulic cylinder and piston means 71 receiving oil from the hydraulic system of the tractor. The cylinder and piston means 71 is connected with the frame 60 via a pipe shaped tension spring 81 of rubber, similar to the pipe shaped springs 64 and 65. The purpose of this spring 81 is to compensate for the lifting movement with respect to the varying diameter of the logs. Log-receiving rollers 72 and 73 are mounted on the forks 68 and 69, which after having been lifted up place the logs in contact with a fluted displacing roller 74, driven from a power take-off 84 on the feed mechanism of the debarking machine, to bring the logs into engagement with the feed rollers 62. The roller 74 is journaled at the free end of a pipe shaped swingably journaled arm 75, within which rotational movement is transmitted to the roller 74 by means of a shaft provided with two universal joints. On the discharge side of the debarking machine there is provided an arm 76, swingable in vertical direction, at the outer end of which is provided a log-receiving hood or shield 77 open toward the rear of the tractor for discharging the debarked logs.

The control of the lifting movement is effected by actuating a lever 85, which via a wire or a link acts on a hydraulic control valve placed in the frame 60. The control can also be made by means of a hydraulic pilot valve provided at the same place as the lever 85 or by a contact means, which when depressed will electrically actuate means governing the position of the hydraulic valve.

In certain cases it can be advantageous to make the lifting movement entirely automatic in such a way, that the outer part of each of the forks 68 and 69 is provided with an impulse member actuated by the own weight of the log and that automatically starts the lifting movement first when the two impulse members are actuated. Thus all that is needed to be done is only to roll the log against the forks so that both impulse members are actuated at the same time.

With the lever 86 is actuated the clutch for the drive to the debarking machine.

Since the last described embodiment of the invention operates substantially in conformity with the embodiment described substantially in conformity with the embodiment described in detail according to Figures 1 and 2 it has been considered that any more detailed detailed description of this latter embodiment is not necessary.

Within the scope of the idea of the invention several different combinations of driven and undriven upper and lower rollers, belts, chains, hydraulic pushers, acting on the end of the log can be considered. There is also nothing to prevent that the lower rollers or conveying members equivalent to same being continually driven, presupposing that the lifting movement is so fast that the log will not have time to move any great distance during the lifting movement.

By the present invention a principle has been indicated for conveying-in of logs to debarking machines of the hollow head type in such cases, when the logs before the conveying have to be moved from a lower to a higher level. By the indicated new principle for such devices the lifting and conveying-in movement can be made in one single operation, which also permits an accurate centering and a well defined position of the log and an automatic and strong conveying-in of the log to the feed mechanism of the debarking machine, which thereby can be made considerably less complicated than when

devices for conveying-in are used, which give a less defined position of the log at least in debarking machines of the hollow head type.

Further, the arrangement can be made easily swingable upwards and foldable, which is of greatest importance for portable machines. Moreover, it is light and comparatively cheap to build in comparison with conventional devices incorporating chain conveyers and chain tables, respectively timber horse and roller table. The arrangement according to the invention requires less space than the conventional devices, since it can be placed closely adjacent the infeed mechanism of the debarking machine furthermore, since no additional guide mechanism is required, the arrangement functions as its own guide mechanism in such a way, that any troubles due to climbing of the guide rollers up on the end of the log cannot occur, because the log-receiving rollers first engage the log on its periphery.

What is claimed is:

1. A log handling mechanism for manipulating logs to be debarked relative to a debarking machine, said machine including feed mechanism operable to feed logs axially of their length while restrained against rotation and debarking means disposed in a plane at substantial right angles to the line of feed, said handling mechanism including means for lifting successive logs to be debarked from a lower log-receiving position to an upper log feeding position so that the logs are on a level approximately coinciding with the line of feed, said lifting means comprising at least two arms extending transversely of the line of feed and located adjacent the infeed side of said debarking machine, said arms including outer log-receiving portions adapted to receive a log with its axis approximately parallel with the line of feed, and journalling means located to one side of said line of feed and journalling said arms for simultaneous swinging movement between a lower log-receiving position and an upper log-feeding position to dispose successive logs in approximate coincidence with the line of feed, means facilitating horizontal displacement of a lifted log comprising freely rotatable rollers carried by said arms for rotation about axes transverse to the line of feed, and driven roll means mounted above the log-feeding position of said arms and rotatable about an axis transverse to the line of feed for engagement with a lifted log responsive to lifting movement of said arms to displace the lifted logs longitudinally toward the debarking machine.

2. A log handling mechanism as claimed in claim 1 and arm means supporting said driven roll means and extending laterally of said debarking machine, resilient means normally biasing said last mentioned arm means to a raised inoperative position and motion transmitting means operatively connected to said last mentioned arm means and responsive to lifting movement of said first mentioned arms to draw said driven roll means and its associated arm toward said first mentioned arms during the final phase of the lifting movement.

3. In a debarking machine, feeding mechanism including infeed and outfeed components operable to feed logs axially of their length while restrained against rotation and debarking means mounted between the infeed and outfeed components and disposed in a plane at substantial right angles to the line of feed, log handling mechanism mounted adjacent the infeed side of the debarking machine and including arm means mounted for swinging movement about an axis parallel to the line of feed and log lifting means carried by said arm means and extending transversely of the line of feed and movable between a lower log-receiving position and an upper position adapted to dispose a log in approximate coincidence with the line of feed, means for moving a lifted log into engagement with the infeed mechanism of a debarking machine, hydraulically actuated piston and cylinder means for swinging said arm means between the lower

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log-receiving position and the upper log-feeding position and control means for said hydraulically actuated means including mechanism operable in response to movement of the outfeed components of the debarking machine when a log being debarked reaches the same to actuate the control means so as to restore said arm means to log-receiving position.

4. In a portable debarking machine a mobile frame, a debarking machine carried by said frame including debarking means and infeed and outfeed mechanism for displacing logs past the debarking means while restrained against rotation along a line transversely of the line of movement of the mobile frame, arm means carried by said mobile frame on the infeed side of the debarking machine and journaled for swinging movement about an axis parallel to the line of feed, log-receiving arms carried by said arm means and extending transversely of the line of feed and including outer portions adapted to receive a log at a lower level with its axis approximately parallel with the line of feed, means for swinging said arm means to lift a log carried by said log-receiving arms to an upper level in approximate coincidence with said line of feed, additional arm means carried by said mobile frame on the infeed side of the debarking machine, said additional arm means extending laterally of the mobile frame and overlying the upper position of said log-receiving arms, driven roll means carried by said additional arm means for rotation about an axis perpendicular to the line of feed and adapted to be engaged by a lifted log and roll means mounted on said log-receiving arms and cooperable with said driven roll means in effecting horizontal longitudinal displacement of a lifted log into engagement with the infeed mechanism of the debarking machine.

5. A portable debarking machine as claimed in claim 4 and said additional arm means being movably mounted for displacement between the operative position extending laterally of said mobile frame and an inoperative approximately vertical position.

6. A portable log debarking machine as claimed in claim 4 in which said additional arm means is movable toward and away from the line of feed, and linkage means actuated in response to upward swinging movement of said first mentioned arm means to displace said additional arm means toward said log-receiving arms.

7. A portable debarking machine as claimed in claim 4 in which the arm means carried by the mobile frame on the infeed side of the debarking machine and journaled for swinging movement about an axis parallel to the line of feed is located so that its axis is to one side of the line of feed, and a guide means depending from said additional arm means from a point above the line of feed and on the opposite side thereof from the location of the axis of said arm means and including a surface directed toward the line of feed shaped to be engaged by and guide a log being lifted by said log-receiving arms to ensure positioning of the lifted log in approximate coincidence with the line of feed.

8. A log handling mechanism for manipulating logs to be debarked relative to a debarking machine, said machine including feed mechanism operable to feed logs axially of their length while restrained against rotation, and debarking means disposed in a plane at substantial right angles to the line of feed, said handling mechanism comprising movable lifting means on the infeed side of said debarking machine and including at least two simultaneously movable components spaced axially of the line of feed, extending transversely thereof and having log receiving surfaces engageable beneath at least two axially spaced portions of a log, means for moving said lifting means from a lower log-receiving position to an upper log-feeding position, whereby successive logs to be debarked are lifted from a lower level up to a level approximately coinciding with the line of feed without

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affecting any substantial displacement of the logs axially of their length, the simultaneous movement of said axially spaced components maintaining the logs in approximate parallelism with the line of feed during lifting and when said logs reach the log-feeding position, and rotatable means carried by the lifting means for rotation about an axis transverse to the line of feed for at least facilitating horizontal longitudinal displacement of a lifted log toward the feed mechanism of the debarking machine.

9. A log handling mechanism for manipulating logs to be debarked relative to a debarking machine, said machine including feed mechanism operable to feed logs axially of their length while restrained against rotation, and debarking means disposed in a plane at substantial right angles to the line of feed, said handling mechanism comprising movable lifting means on the infeed side of said debarking machine and including at least two simultaneously movable components spaced axially of the line of feed, extending transversely thereof and having log-receiving surfaces engageable beneath at least two axially spaced portions of a log, means for moving said lifting means from a lower log-receiving position to an upper log-feeding position whereby successive logs to be debarked are lifted from a lower level up to a level approximately coinciding with the line of feed without effecting any substantial displacement of the logs axially of their length, the simultaneous movement of said axially spaced components maintaining the logs in approximate parallelism with the line of feed during lifting and when said logs reach the log-feeding position, rotatable means carried by the lifting means for rotation about an axis transverse to the line of feed for at least facilitating horizontal longitudinal displacement of a lifted log toward the feed mechanism of the debarking machine, and driven rotatable means supported on the infeed side of the debarking machine above the upper position of said lifting means and engageable with the upper surface of a lifted log to effect horizontal displacement thereof toward the debarking machine.

10. In a portable debarking machine, a mobile frame, a debarking mechanism including debarking means and infeed and outfeed components for displacing logs past the debarking means while they are restrained against rotation along a line that is transverse to the line of movement of the mobile frame, a first arm means, means mounting said first arm means on the infeed side of the debarking mechanism for folding movement between an upright inoperative position and an extended operative position in which said arm means is directed laterally of the mobile frame, means journalling said arm means when in the operative position for swinging movement about an axis parallel to the line of feed, log-receiving arms carried by said first arm means at at least two axially spaced portions thereof, said log-receiving arms extending transversely of the line of feed and including outer portions adapted to receive a log at a level lower than the line of feed but with its axis approximately parallel to the line of feed, means for swinging said arm means upwardly to lift a log carried by the log-receiving arms to an upper level in approximate coincidence with said line of feed, additional arm means carried by said mobile frame and mounted for swinging movement about an axis transverse to the line of feed and located above the operative position of said first-mentioned arm means, said additional arm means being swingable to a position to extend laterally of the mobile frame and to overlie the upper operative position of said log-receiving arms, driven roll means carried by said additional arm means for rotation about an axis perpendicular to the line of feed, other roll means mounted on said log-receiving arms for rotation about an axis parallel to the axis of the driven roll means, whereby upward swinging movement of said first arm means when in operative laterally extended position lifts a log carried by said log-receiving arms into engagement with said driven roll means so that a log supported on said other

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roll means is automatically horizontally longitudinally displaced into engagement with the infeed components of the debarking mechanism, and further arm means carried by the mobile frame on the outfeed side of the debarking mechanism and movable between an inoperative raised position and an operative lower position extending laterally of the mobile frame and including log-receiving surfaces adapted to receive a debarked log that has passed through the debarking mechanism.

11. A log handling mechanism for lifting and then horizontally longitudinally displacing successive logs in approximate coincidence with a predetermined line of movement, said mechanism comprising log-lifting means including rotatable means mounted for rotation about an axis transverse to said line of movement, means mounting said log-lifting means for movement between a lower log-receiving position and an upper log-feeding position, and driven means supported above the upper position of said log-lifting means for movement in a direction along said line of movement and engageable by a log being lifted to effect horizontal longitudinal displacement thereof along said line of movement.

12. A log handling mechanism as claimed in claim 11 in which said log-lifting means are mounted for swinging movement about an axis parallel to the line of feed and located to one side of the line of feed, said log lift-

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ing means being adapted to support a log with its axis approximately parallel to the line of feed and guide means depending from a position above said line of feed and on the side of the line of feed opposite the axis of swinging movement of said log-lifting means and having a surface facing the line of feed adapted to guide a lifted log into approximate coincidence with said line of feed as such a log is being lifted.

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